

## The Contributors to this Issue

GEORGE A. CAMPBELL, B.S., Massachusetts Institute of Technology, 1891; A.B., Harvard, 1892; Ph.D., 1901; Göttingen, Vienna and Paris, 1893-96. Mechanical Department, American Bell Telephone Company, 1897; Engineering Department, American Telephone and Telegraph Company, 1903-1919; Department of Development and Research, 1919—; Research Engineer, 1908—. Dr. Campbell has published papers on loading and the theory of electric circuits and is also well-known to telephone engineers for his contributions to repeater and substation circuits. The electric filter which is one of his inventions plays a fundamental rôle in telephone repeater, carrier current and radio systems.

RALPH V. L. HARTLEY, A.B., Utah, 1909; B.A., Oxford, 1912; B.Sc., 1913; instructor in physics, Nevada, 1909-10; Engineering Department, Western Electric Company, 1913—. For some time Mr. Hartley has been closely connected with the development of carrier current, telephone repeater, and telegraph systems.

THORNTON C. FRY, A.B., Findlay, 1912; A.M., University of Wisconsin, 1913; Ph.D., 1920; instructor of mathematics, Wisconsin, 1912-16; Engineering Department, Western Electric Company, 1916—. Mr. Fry has written several papers on the theory of electric circuits and other subjects allied to telephony.

JOHN R. CARSON, B.S., Princeton, 1907; E.E., 1909; M.S., 1912; Research Department, Westinghouse Electric and Manufacturing Company; 1910-12; instructor of physics and electrical engineering, Princeton, 1912-14; American Telephone and Telegraph Company, Engineering Department, 1914-15; Patent Department, 1916-17; Engineering Department, 1918; Department of Development and Research, 1919—. Mr. Carson's work has been along theoretical lines and he has published several papers on theory of electric circuits and electric wave propagation.

R. L. WEGEL, A.B., Ripon College, 1910; assistant in physics, University of Wisconsin, 1910-12; physicist with T. A. Edison, 1912-13; Engineering Department of Western Electric Company, 1914—. Mr. Wegel has been closely associated with the development of telephone transmitters and receivers, and has made important contributions to the theory of receivers.

EDWARD C. MOLINA, Engineering Department of the American Telephone and Telegraph Company, 1901-19, as engineering assistant; transferred to the Circuits Design Department to work on machine switching systems, 1905; Department of Development and Research, 1919—. Mr. Molina has been closely associated with the application of the mathematical theory of probabilities to trunking problems and has taken out several important patents relating to machine switching.

WILLIAM C. HELMLE, B. S., University of Wisconsin, 1917; University of Chicago, 1919-20; Commercial Engineer's Office, American Telephone and Telegraph Company 1920—.

E. T. HOCH, B.S., in Electrical Engineering, Case School of Applied Science, 1914; Western Electric Company, Manufacturing and Installation Departments, 1914-15; Engineering Department, 1915—.

LLOYD ESPENSCHIED, Pratt Institute, 1909; United Wireless Telegraph Company as radio operator, summers, 1907-08; Telefunken Wireless Telegraph Company of America assistant engineer, 1909-10; American Telephone and Telegraph Company, Engineering Department and Department of Development and Research, 1910—. Took part in long distance radio telephone experiments from Washington to Hawaii and Paris, 1915; since then his work has been connected with the development of radio and carrier systems.

J. B. JOHNSON, B.S., University of North Dakota, 1913; M.S., 1914; Ph.D., Yale, 1917; Engineering Department, Western Electric Company, 1917—. Since coming to the Western Electric Company, Mr. Johnson has devoted much time to high vacua and ionization in gases.